



# AUTOPILOT

## AP-1

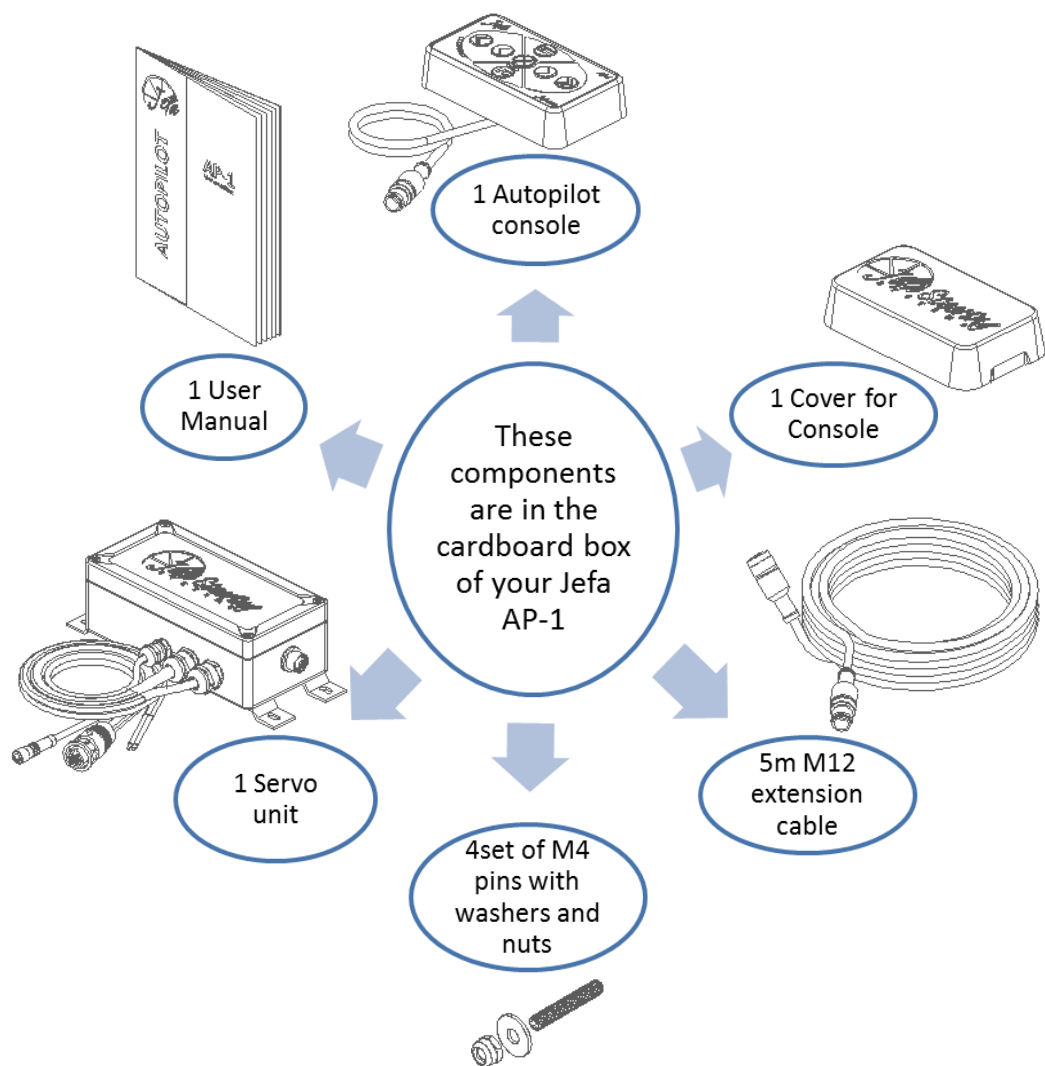
*User manual V1.1*



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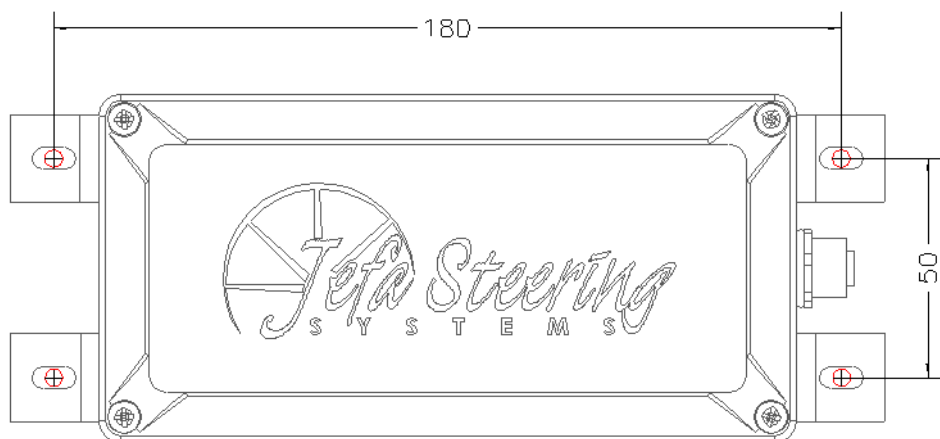
## Introduction and installation



## Servo unit installation

The Jefa AP-1 autopilot system consists of two units, a servo unit which handles all the electrical power connections, and a console unit for the helmsman to operate.

To install the servo unit, fasten the servo unit to the boat in a dry environment, preferably as near to the autopilot drive unit as possible.

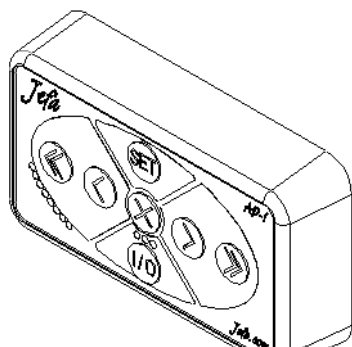


## Console unit installation

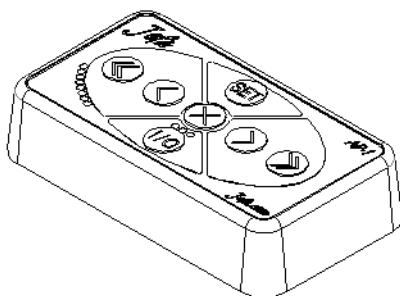
Installing the console unit is fairly simple, but great care must be taken to ensure that there is no magnetic interference near the console unit, such as the ships compass, electrical motors or big lumps of iron for instance.

This is important as the console unit measures the earth magnetic field in order to navigate the vessel.

The console can be mounted in either upright orientation (i.e. vertical) or in level orientation (i.e. "lying down") to navigate.

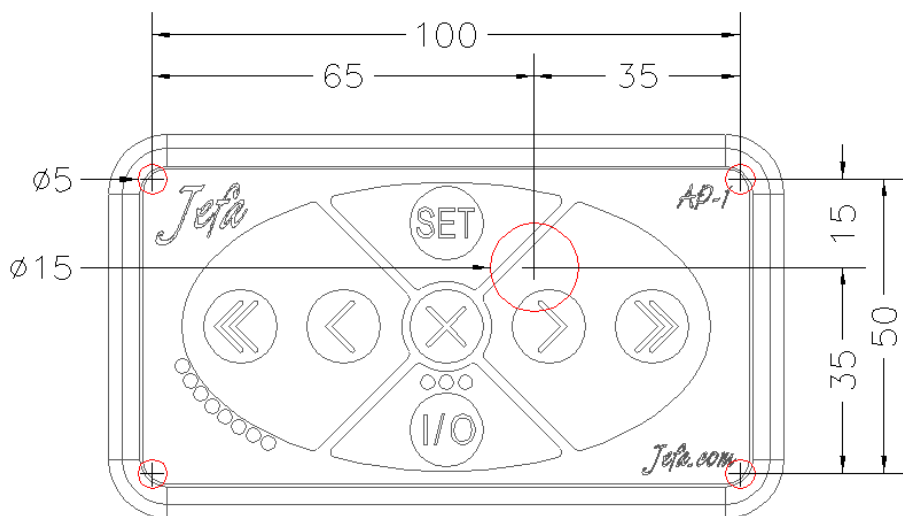


Upright orientation  
(i.e. vertical)



Level orientation  
(i.e. "Lying down")

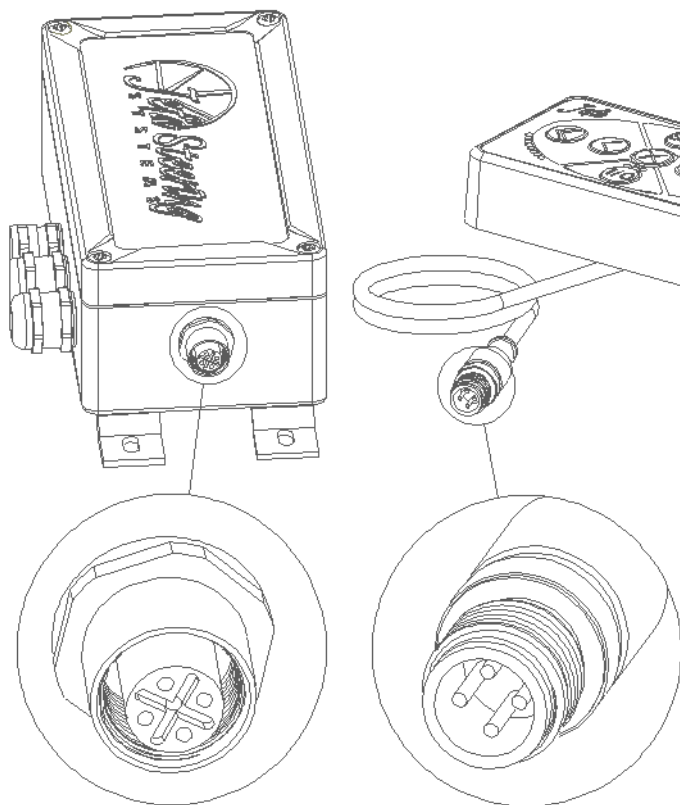
When a suitable mounting place has been found, drill a 15mm hole for the connection cord and 4pcs 5mm holes for the mounting screws using the drill guide below.



Mount the console with the 4pcs M4 screws, washers and nuts.

## Electrical connection

The two units are connected together with an M12 extension cable from the console that screws into a connector on the servo unit.



**NOTE:** The extension cable between the console and the servo unit must not be curled up near the console unit, since the can build magnetic interference in the console unit compass



When the servo and the console units are mounted, and connected, then connection to power, the drive unit and the rudder feed-back, should be made.

**NOTE:** Before installing the autopilot, the negative terminal to the boats battery must be detached.

Now connect the rudder feedback and the drive unit with mounted connectors.

The power connection should be made using 2.5mm<sup>2</sup> wires. The red wire must be connected to 12V positive and the black wire must be connected to 12V negative.

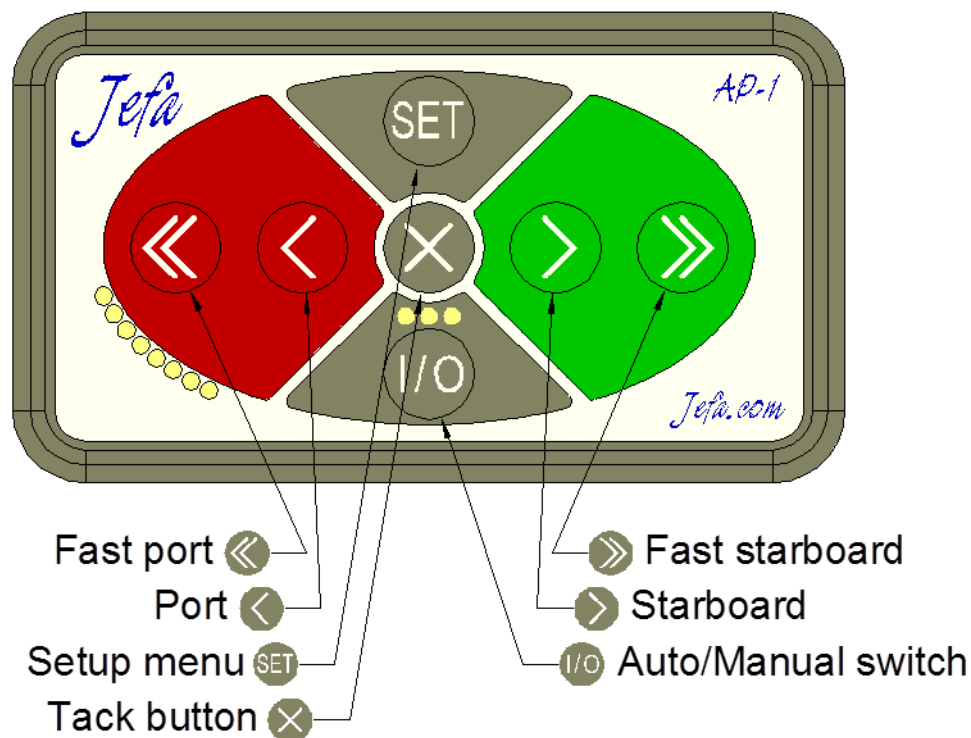
Complete the installation by reattaching the boats battery negative terminal.

Your Jefa AP-1 is now installed and ready for setup.





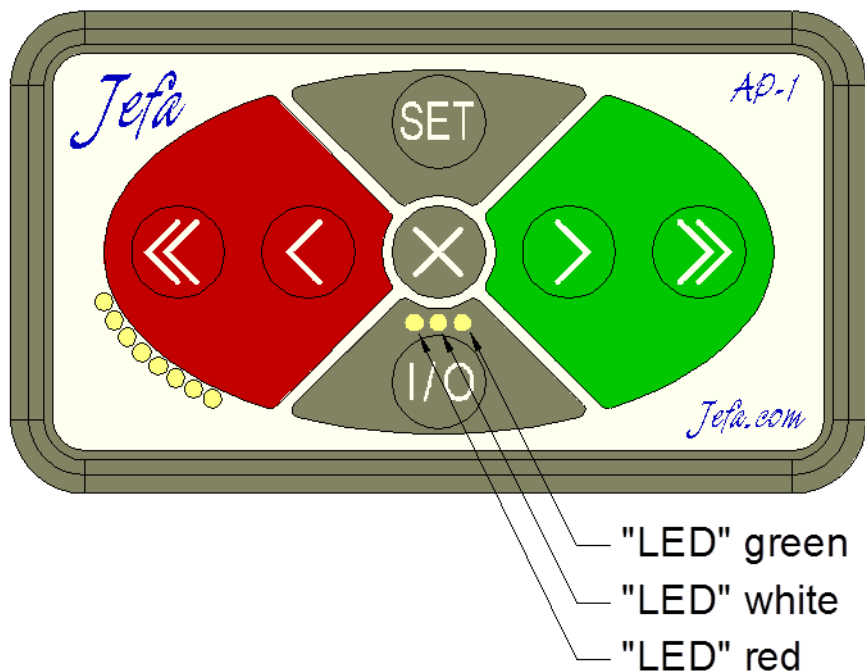
## Jefa AP-1 autopilot

Designed to be as simple as possible to use, and the console has only the following seven buttons to operate:



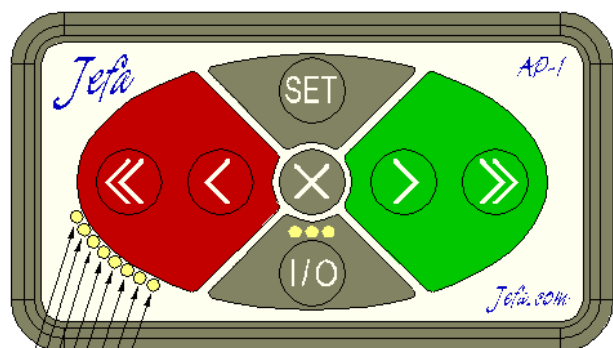
### 3 LED's

Between the  (tack) and  (I/O) buttons are located three LED's – a red, a white and a green.



## 8 LED's

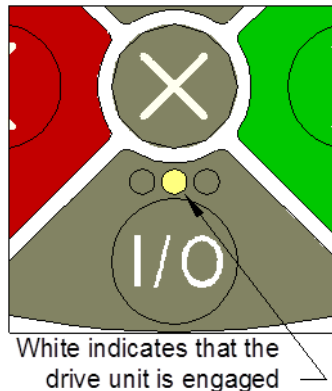
In the lower left corner is 8 white LED's used in setup which has 6 different entries.



- 8. For use in setup
- 7. For use in setup
- 6. Compass calibration
- 5. Rudder extremes
- 4. Console orientation
- 3. Integration parameter
- 2. Rudder damping adjustment
- 1. Rudder gain adjustment

## Enter the setup entries

To enter the setup entries press and hold **SET** (SET) for one second. You will hear a short high-pitch noise, and the first of the 8 LED's will be lit. If you press again, you get the next entry point, and the next LED's will be lit and so on.



Jefa AP-1 should not be engaged while initializing the setup.  
Press **I/O** (I/O) to engage and disengage Jefa AP-1

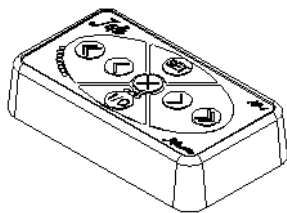
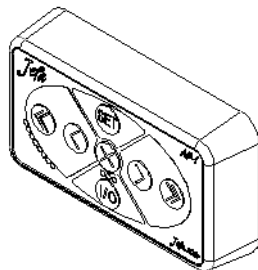
Exit setup by pressing **I/O** (I/O).

## Necessary initial setup before use

(read entire manual before starting setup):

### 4. Console orientation

Jefa AP-1 can be mounted in upright orientation (i.e. vertical) as seen on the picture on the right.

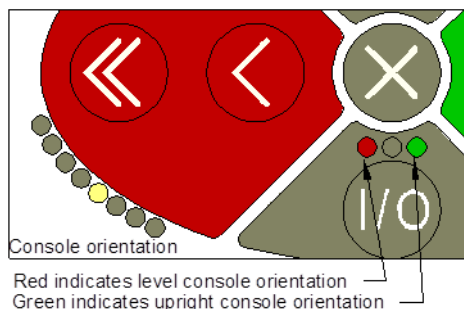


or mounted in level orientation (i.e. "lying down") as seen on the picture on the left

This information is important for Jefa AP-1 since the compass is build into the console unit.

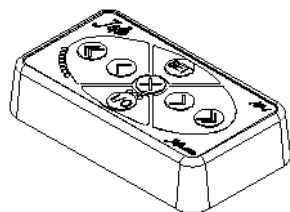
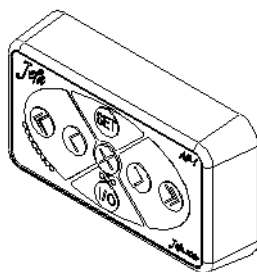
To switch between the two modes, make sure that Jefa AP-1 is not engaged, press and hold **SET** (SET) for one second till you hear a short high-pitch noise.

Press **SET** (SET) yet another three times for Console orientation entry. The fourth setup LED is lit, and either the red or the green LED will be lit.



Green indicates upright orientation, and red indicates level orientation.

Press **>** (starboard) if your Jefa AP-1 is mounted in an upright orientation, as the picture on the right.



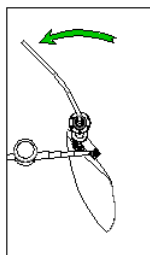
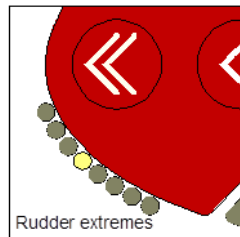
Press **<** (port) if your Jefa AP-1 is mounted in a level orientation, as the picture on the left

Press **I/O** (I/O) to exit setup.

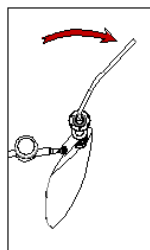
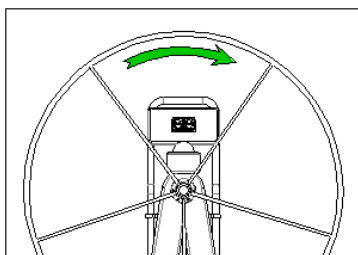
## 5. Rudder extremes

Jefa AP-1 need information of full starboard and full port positions of the rudder to ensure the drive never is forced beyond these limits.

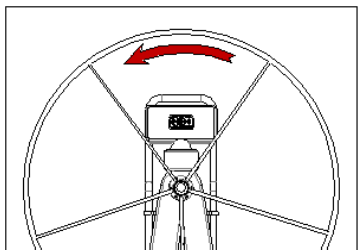
First make sure that Jefa AP-1 is not engaged, press and hold **SET** (SET) for one second till you hear a short high-pitch noise. Press **SET** (SET) yet another four times for Rudder extremes entry (the fifth setup LED is lit).

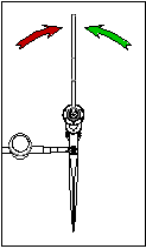



Turn the rudder full starboard and press **>** (starboard)

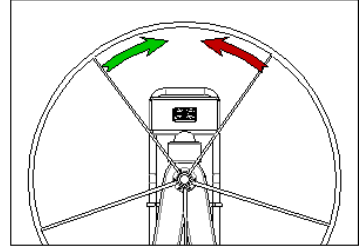


Next turn the rudder full port and press **<** (port)





Finally turn the rudder approximately to mid-ship position, and press  (tack).  
**\*please read NOTE below first!**



Jefa AP-1 will engage your drive unit and turn the rudder a few degrees starboard and port to test the installation, and it will disengage again when the test is done.


**NOTE:** Be prepared to disconnect the power completely (cut the wire from the battery!) in case the rudder is moved more than a few degrees back and forth during the test procedure, as this indicate serious problems with the rudder feedback, which can lead to rudder damage!

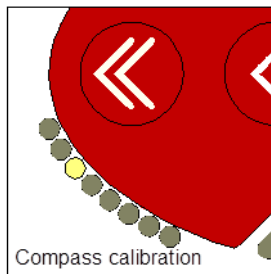
Exit setup by pressing  (I/O).





## 6. Compass calibration

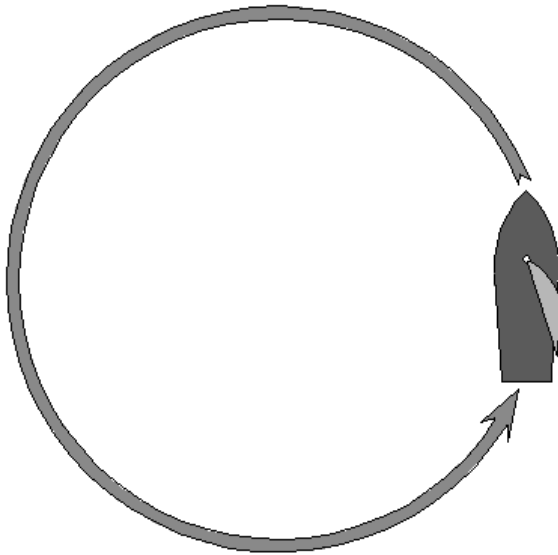
Compass calibration for hot iron should be done on flat water sailing under power.



First make sure that Jefa AP-1 is not engaged, press and hold  (SET) for one second till you hear a short high-pitch noise.



Press  (SET) yet another five times for Rudder extremes entry (the sixth setup LED is lit) then press  (tack) to begin the calibration.

Then complete a full 360° turn very slowly. It should take at least 30 seconds to complete the circle.



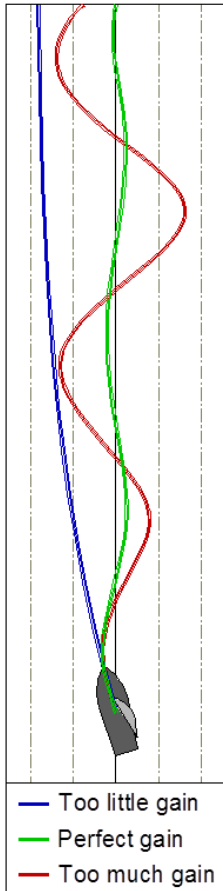
When the turn is completed press  (tack) to finish the calibration or press  (I/O) to exit setup.

Your initial setup is done and Jefa AP-1 is ready for use.

## Three setup entries for adjusting your autopilot to get the best performance

### 1. Rudder gain adjustment

The factory settings should usually be sufficient for most boats, but it might be decreased on boats that are very sensitive to the helm, or increased on boats with a very sluggish rudder response.

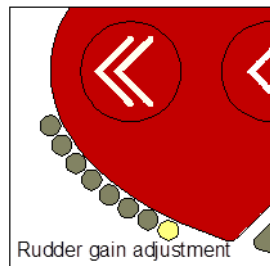


A small rudder gain will only turn the rudder a few degrees when the boat is out of course. When the rudder gain is too little, your boat will never reach the wanted course.

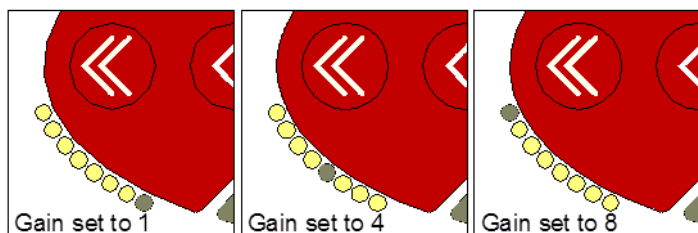
A big rudder gain turns the rudder more when the boat is out of course. When the rudder gain is too big, the rudder turns too much and takes too long to turn back, and the boat start's hunting.

You should set the rudder gain as high as possible without the boat still hunting.

To adjust the rudder gain, first make sure that Jefa AP-1 is not engaged, press and hold **SET** (SET) for one second till you hear a short high-pitch noise (the first setup LED is lit for Rudder gain adjustment), press **⊗** (tack) to enable the adjustment.



All eight LED's will light up except for one which indicates the gain setting.



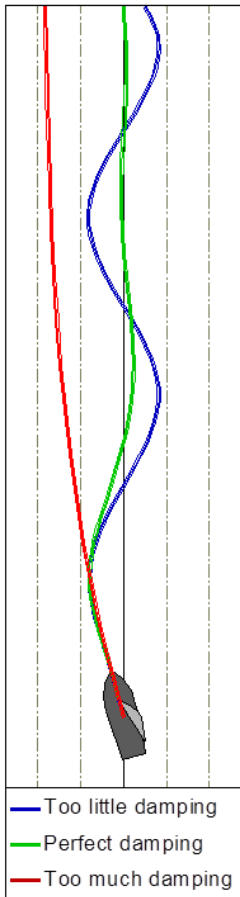
The rudder gain can be adjusted from 1 to 8, and the factory setting is 4.

Press **⏪** (port) to increase gain, press **⏩** (starboard) to decrease it.

Press **⊗** (tack) to finish adjustment, or **I/O** (I/O) to exit setup completely.

## 2. Rudder damping adjustment

The default setting of the rudder damping should usually be sufficient for most boats, but it can be increased if the autopilot has a tendency to overshoot too much when making bigger course corrections, or decreased if not overshooting at all.

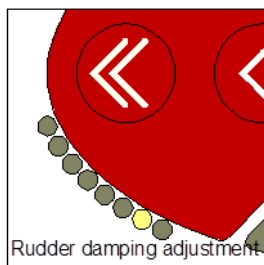


Rudder damping let's your rudder turn mid-ships before your boat is on the actual course.

Too much rudder damping will straighten your turn so fast that your boat cannot reach the wanted course.

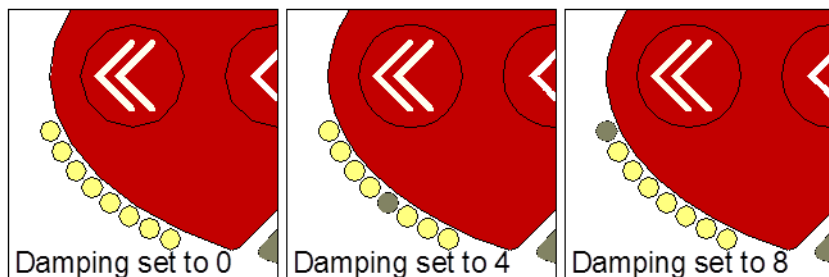
A perfect rudder damping will straighten the turn just before the wanted course, making the turn as quickly and smooth as possible.

Too little rudder damping can have a result of hunting in certain conditions.



To adjust the rudder damping first make sure that Jefa AP-1 is not engaged, press and hold **SET** (SET) for one second till you hear a short high-pitch noise. Press **SET** (SET) one more time for Rudder damping entry (the second setup LED is lit), then press **⊗** (tack) to enable adjustment.

All LED's except one will now light up, and the turned off LED indicates the setting. Unless none of the LED's is lit which indicates rudder damping is set to 0.



The rudder damping can be adjusted from 0 to 8.  
The factory setting of rudder damping is 3.

To increase the rudder damping press **<** (port) and to decrease press **>** (starboard).

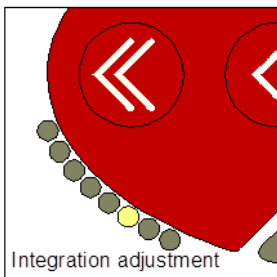
Press **⊗** (tack) to finish the adjustment, or **I/O** (I/O) to exit setup completely.

### 3. Integration parameters

The default settings of the integration parameters will usually be sufficient for most boats.

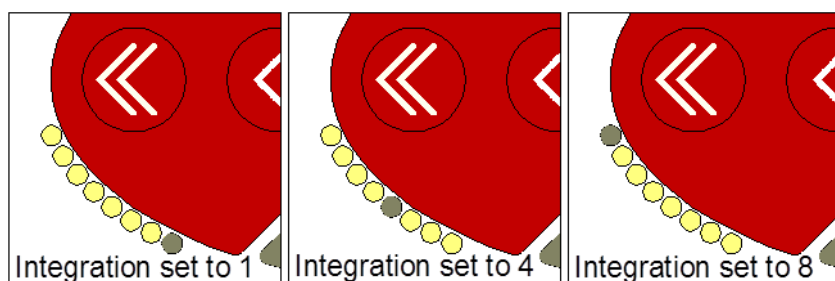
The integration should be increased, in cases with a persistent error on the course, such as pressure from either the wind, or the flow of water.

Setting the integration parameters too high, can have the result of hunting in certain conditions.







To adjust the integration parameters, first make sure that Jefa AP-1 is not engaged, press and hold **SET** (SET) for one second till you hear a short high-pitch noise. Press **SET** (SET) two more time for Integration parameters entry (the third setup LED is lit), then press **×** (tack) to enable adjustment.

All LED's except one will now light up, and the turned off LED indicates the setting.



The rudder damping can be adjusted from 1 to 8.  
The factory setting of rudder damping is 4.




To increase the rudder damping press  (port) and to decrease press  (starboard).

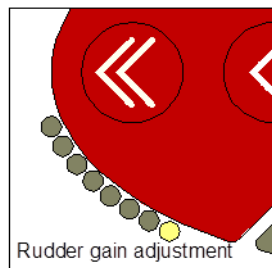
Press  (tack) to finish the adjustment, or  (I/O) to exit setup completely.



## Resetting factory settings


Jefa AP-1 can be reset to the factory settings if so desired.

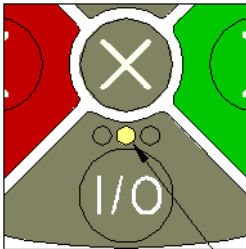
To reset you have to make sure that Jefa AP-1 is disengaged, press and hold  (SET) for one second till you hear a short high-pitch noise, to enter the rudder gain adjustment entry, and then press  (fast port) and  (fast starboard) buttons simultaneously to reset Jefa AP-1.





**Note:** This also resets the rudder extreme positions and console orientation, so Jefa AP-1 will not function until rudder extreme setup has been carried out again.



## Using Jefa AP-1 autopilot


Operating Jefa AP-1 in daily use is straight forward. Put the boat on the wanted course, and press  (I/O) to switch to automated steering with autopilot.



Jefa AP-1 will engage the drive unit and take control of the rudder. The white LED will be lit indicating that the drive unit is engaged.

Minor corrections to the course can be made by pressing the  (port) or  (starboard) buttons.

Larger corrections can be made by pressing  (fast port) or  (fast starboard) buttons.

To switch back to manual steering press  (I/O) again, and Jefa AP-1 will disengage the clutch in the drive unit and release the rudder for manual control.